Flexible Controller

One-Axis Stage Controller

GSC-01

For Your Safety

User's Manual

OptoSigma®

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For Your Safety

Before using this product, read this manual and all warnings or cautions in the documentation provided.
Only Factory Authorized Personnel should be changes and/or adjust the parts of controller.

The Symbols Used in This Manual

⚠ WARNING	⚠ CAUTION
This symbol marks warnings that should be read and used to prevent serious injury or death.	This symbol indicates where caution should be used to avoid possible injury to yourself or others, or damage to property.

The above indications are used together with the following symbols to indicate the exact nature of the warning or caution.

Examples of Symbols Accompanying Warnings and Cautions	
	△Symbols enclosed in a triangle indicate warnings and cautions. The exact nature of the warning or caution is indicated by the symbol inside (the symbol at left indicates risk of electrocution).
	○Symbols enclosed in a circle mark indicate prohibitions(actions that must not be performed). The exact nature of the prohibition is indicates by the symbol inside or next to the circle mark (the symbol at left indicates that the product must not be disassembled).
	●Symbols inside a black circle mark actions that must be performed to ensure safety. The exact nature of the action that must be performed is indicated by the symbol inside (the symbol at left is used in cases in which the AC adapter must be unplugged to ensure safety).

Symbols on the product

The symbol mark on the product calls your attention. Please refer to the manual, in the case that you operate the part of the symbol mark on the product.

	This symbol labeled on the portion calls your attention.

Disclaimer of Liability

① SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product or the inability to use this product.
② SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product that deviates from that described in the manual.
③ SIGMAKOKI CO., LTD. does not accept liability for damages resulting from the use of this product in extraordinary conditions, including fire, earthquakes, and other acts of God, action by any third party, other accidents, and deliberate or accidental misuse.
④ If the equipment is used in a manner not specified by the SIGMAKOKI CO., LTD., the protection provided by the equipment may be impaired.

⚠ WARNING

- Do not use this product in the presence of flammable gas, explosives, or corrosive substances, in areas exposed to high levels of moisture or humidity, in poorly ventilated areas, or near flammable materials.
- Do not connect or check the product while the power is on.
- Installation and connection should be performed only by a qualified technician.
- Do not bend, pull, damage, or modify the power or connecting cables.
- Do not touch the products internal parts.
- Connect the earth terminal to ground.
- Should the product overheat, or should you notice an unusual smell, heat, or unusual noises coming from the product, turn off the power immediately.
- Do not turn on the power in the event that it has received a strong physical shock as the result of a fall or other accident.
- Do not touch the stage while operation.
- Use dry clothes only for cleaning the equipment.

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Chapter 1: Before You Begin

1. Check Inside the Package

Purchasers of the Stage Controller should find that the package contains the items listed below. Check t he package contents using the following checklist. Contact your retailer as soon as possible in the event that you should find that any item is missing or damaged.

□GSC-01 Stage Controller: 1

□User's Manual (This manual): 1

Options (sold separately)

□RS232C cable
Model No：RS232C/STR

□AC adaptor set
Model No：PAT-001-POW

※Unnecessary if you use an external power unit you already have.

You can download Configuration program from "stage Controllers" page on our web page.
View our home page http://www.global-optosigma.com/en-jp/support/

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2. Setup Automatic Stage

GSC-01 supports the SIGMAKOKI automatic stages below. Use the configuration software to set adequate values to configure GSC-01 operations.

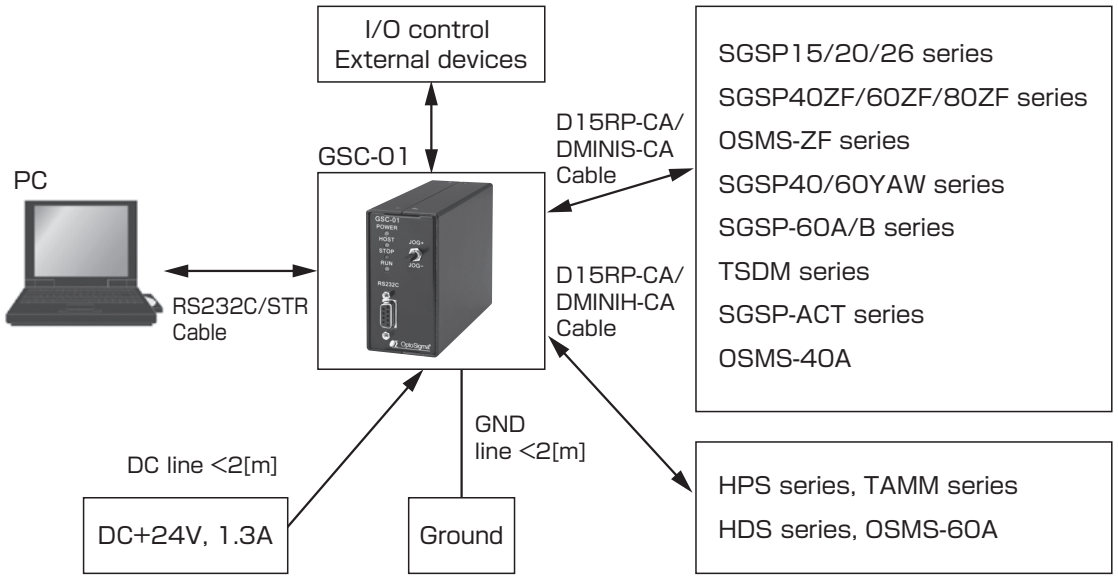
□Translation Stages	SGSP-15/20/26 series, TSDM series, TAMM series, HPS series
□Z-Axis Stages	SGSP40/60/80-ZF series, OSMS-ZF
□Rotating Stages	SGSP-40YAW/60YAW series, HDS series
□Gonio Stage	SGSP-60A/B series, OSMS-40A, OSMS-60A
□Actuator	SGSP-ACT series

See "A-1. List of Configurations for Applicable Automatic Stages" for the values for configuration.

Use the following motor cable for the connection between GSC-01 and automatic stages.

□Motor Cable
Model No：D15RP-CA-◇
DMINIS-CA-△, DMINIH-CA-△
※◇ presents the length of the cable [2,3,5[m]]
※△ presents the length of the cable [1,2,3,4,5[m]]

3. The GSC-01 System



⚠ Make sure to set up and wire the cable supplying DC+24V and GND to the GSC-01 so that the maximum length of cable is not longer than 2m.

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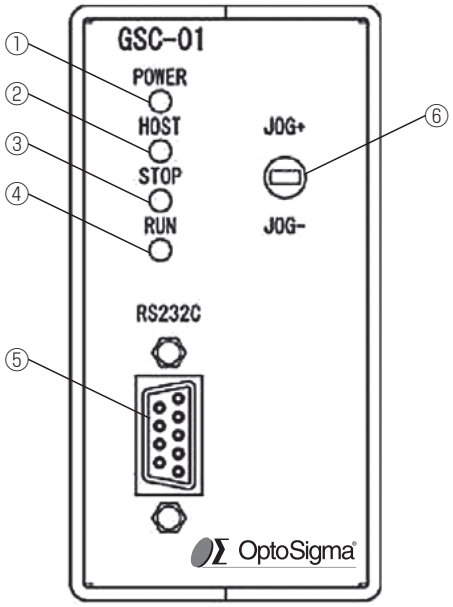
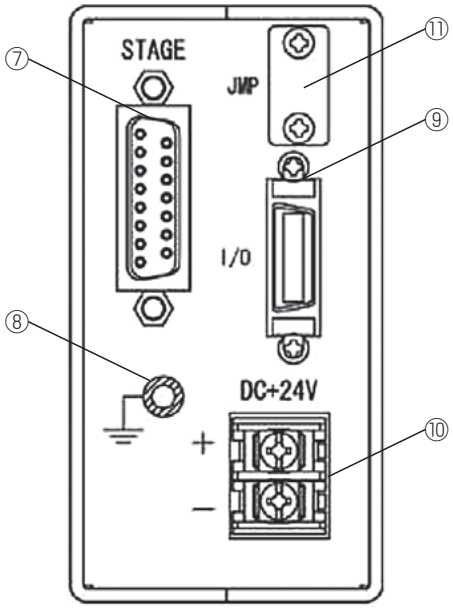
4. Parts of the GSC-01

4-1. Front Panel



①POWER LED : Lights up in green when powered.
②HOST LED : Lights up in green during communications with the host.
③STOP LED : Lights up in red when emergency stop.
④RUN LED : Lights up in orange when the motor is operated.
⑤RS232C Connector : Connect a RS232C Cable.
⑥JOG switch : Controls movement in JOG mode.

4-2. Rear Panel



⑦STAGE Connector : Connect a Stage cable.
⑧FG terminal : Terminal for frame ground connection. To use this controller, you should connect it to ground.
⑨I/O Connector : I/O connector.
⑩Power terminals : Connect to the power source (+24V, 1.3A).
⑪JMP connector : To enable the e-stop signal, set the jumper cable (open→short).

⚠ Turn off a power supply in the case of the connector connection for security.

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Chapter 2: Configuration program

Download Configuration program for GSC-01 from our web page.

View our home page http://www.global-optosigma.com

Install the configuration program for setting up the operation of the GSC-01 on your PC. Configure operational settings for GSC-01 with this tool before you use it. Using the GSC-01 without the configuring it may cause not only malfunctions but also damage to this device and/or the stages.

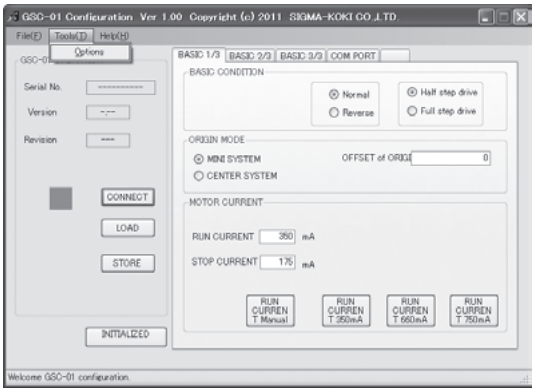
*)Please download from the page of "Sample Software" or "Stage Controllers" on "Support information" on our website about the configuration program.

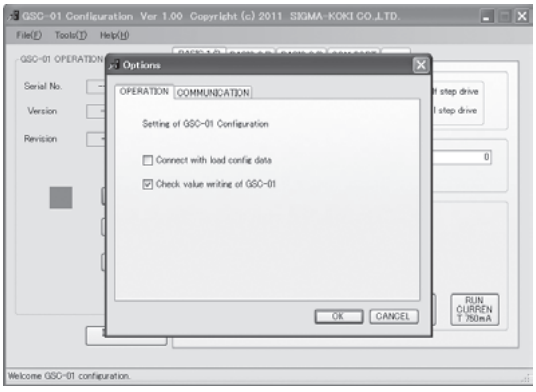
http://www.global-optosigma.com/en_jp/support/

5. Use the Configuration Program

5-1. Setup Communications

Correctly connect the GSC-01 to the PC where the Configuration Program has been installed. Connect with the RS232C cable. Start up Configuration Program. When the program is started up, select **Tools**, and then select **Options** to make port/ baud rate settings for PC. Select the port where GSC-01 is connected the communications port. Set the baud rate to 9600.

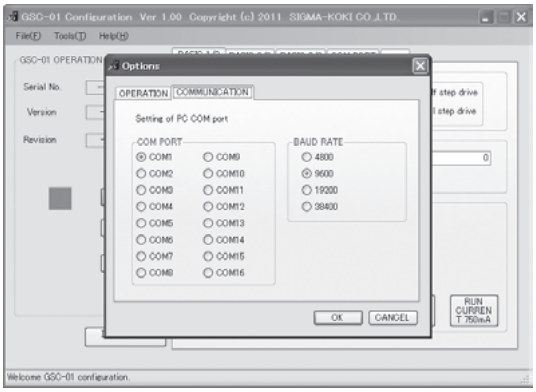




1) The **OPERATION** and **COMMUNICATION** tabs are provided in the **Options** screen. Select the **CHECK value writing of GSC-01** Option in the **OPERATION** tab.

2) After that, set **BAUD RATE** to **9600**, select a port **(COM PORT)** for connecting with GSC-01 in the **COMMUNICATION** tab. Then click **OK**.

The settings for PC have been completed.



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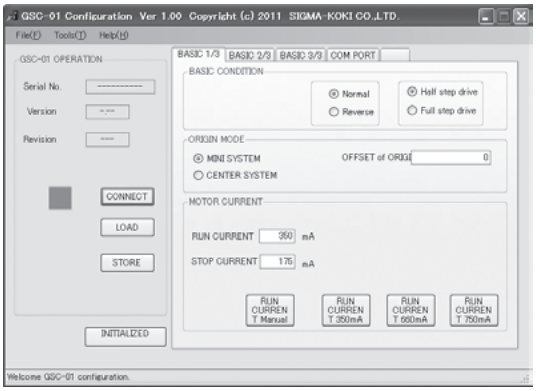
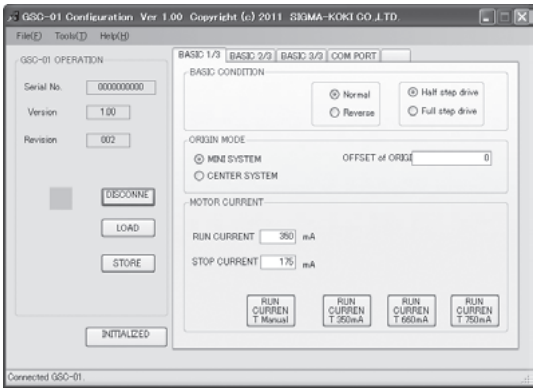
Next, connect the power via the terminals on the GSC-01 rear panel. Take great care to never connect to wrong terminals such as the terminals for different power voltages or reverse polarities. After turning the power ON, make sure the power indicator LED lights up in green on the GSC-01 front panel. If you do not find no problem click the **CONNECT** button.





If the communications have been established successfully, the above screen is displayed, the indicator turns green is displayed. If an error is displayed, you must check the connection and the baud rate setting again.

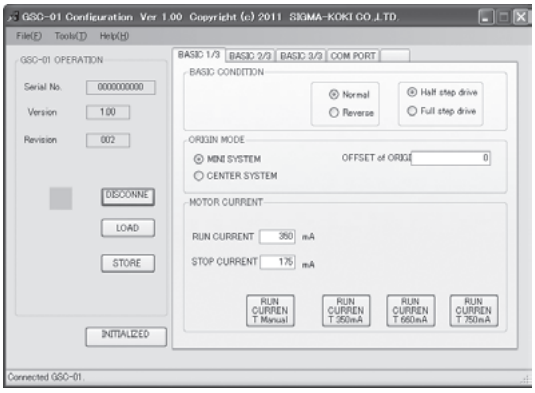
5-2. Change Configurations

The configuration program has four tabs to allow you to change the settings of the GSC-01 if necessary. Clicking the **INITIALIZED DEFAULT** button can restore the factory-set configurations completely.

If you change configurations, you must write them to GSC-01 by click to **STORE** button.

5-2-1. BASIC 1 Tab

Check/ change drive parameters for the stages you are using.



・BASIC CONDITION : Set the rotating direction of the motor and select full step drive/ half step drive.
For SIGMA's stages, the normal rotating direction means the same moving direction as the existing controllers. Note that the locations of the limit sensor are reversed.

・ORIGIN MODE : Sets operational mode for homing the stage. Selecting MINI SYSTEM

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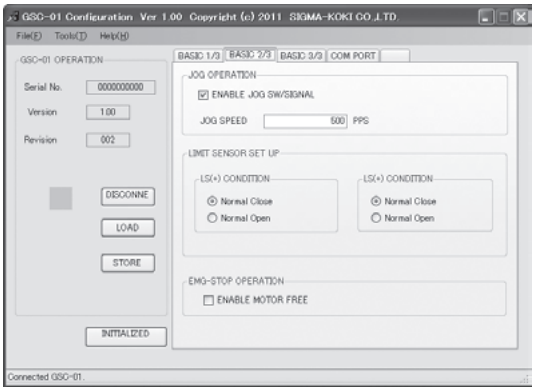
the home position in the negative limit sensor (LS–) direction. Setting a numeric value in the OFFSET of ORIGIN box allows you to move a stage equal to the home position (coordinate = 0) to the reached point.
Selecting the CENTER SYSTEM mode will place the home position at the center point between the limit sensor. OFFSET of ORIGIN is ineffective in the CENTER SYSTEM mode.

・MOTOR CURRENT: Set the drive current (RUN CURRENT) and stop current (STOP CURRENT) of the motor. For SIGMA's stages, use an appropriate RUN CURRENT button. The button also set the corresponding stop currents at the same time. In this case, the stop current set will be half the value of the run current.
Specify the currents within the ratings of the motor. Operating the motor at higher currents than rated, the motor may overheat or be damaged.

5-2-2. BASIC 2 Tab

Check/ change the settings for jog switch operations and limit switch signals for GSC-01.



・JOG OPERATION: If the ENABLE JOG SW/ SIGNAL check box is checked, the jog switch on the GSC-01 front panel and the jog signals via the I/O connector on the rear panel are enabled.
The JOG SPEED box allows you to set the speed of the stage when it is operated with jog switch or a jog signal is input.
Note that since jog moves are not accelerated/ decelerated, setting too high speeds may cause loss of synchronism. Select an adequate speed that does not cause loss of synchronism. A stage may be damaged if you continue to move it with loss of synchronism for a long time.

・LIMIT SENSOR SET UP: Set the determination logic for the limit sensors. Normally select Normal Close for SIGMA's stages. Note that selecting a wrong logic may cause malfunctions.

・EMG-STOP OPERATION: Energize/ deenergize the motor on an emergency stop. Note that a Z-axis stage may fall on an emergency-stop.

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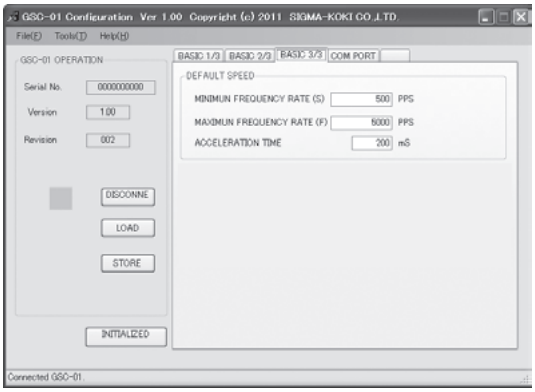
5-2-3. BASIC 3 Tab

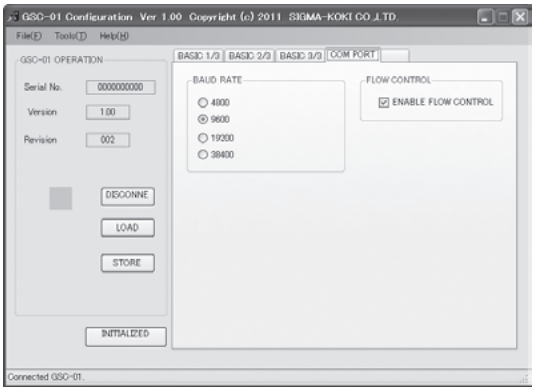
Check/ change the settings for driving speed on power-on time for GSC-01.



・SPEED SETTING : Set the initial speed setting used at power on.
The set range SPEED_S and SPEED_F is 100-20000[PPS]. The set range acceleration/ deceleration time is 0-1000[mS].
Be sure to set the maximum speed(F) higher than the minimum speed(S). Set the speed in 100[pps]. Values less than 100[pps] are rounded down.

5-2-4. COM PORT Tab

Check/ change the communications setup for GSC-01.
Changing the communications setup for GSC-01 requires the reconfiguration of the communications setup on the host (PC). Note that if the communications setups for the GSC-01 and the host do not match, the both side cannot communicate each other successfully.



・BAUD RATE : Select a baud rate applied in the communications with the host (PC). The same baud rate as set on the host (PC).

・FLOW CONTROL : Enable/ disable the flow control. Check the ENABLE FLOW CONTROL check box to enable the flow control for the hardware. Set the flow control setup to Hardware on the host (PC).

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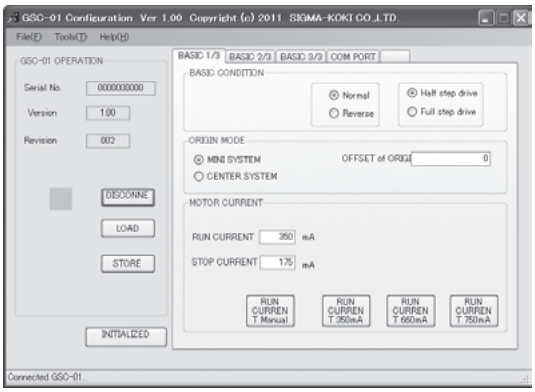
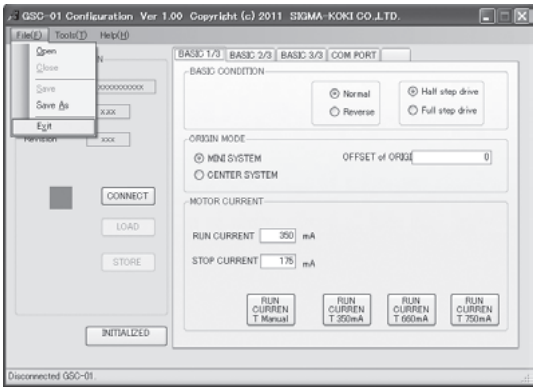
5-3. Exit the GSC-01 Configuration Program

To exit the **GSC-01 Configuration Program**, first click the **DISCONNECT** button, and when the indicator turns red, select **Exit** in the **File** menu. You can exit the program safely.
After having written in setting at GSC-01, please spend a power supply of GSC-01 again by all means.
The setting that wrote in from a point in time when GSC-01 rebooted becomes effective normally.

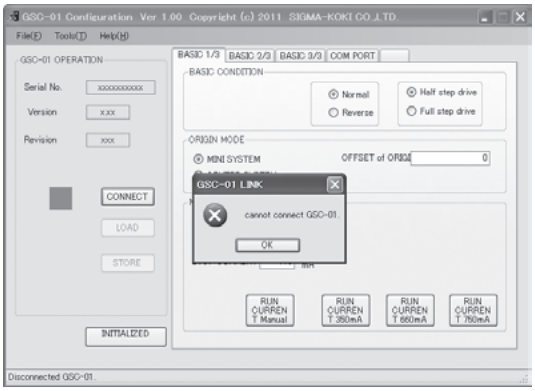




5-4. Error Display

This section describes the typical error displays and the countermeasures in **GSC-01 Configuration Program.**

Message: Cannot connect GSC-01.



- **Are your GSC-01 and PC connected correctly?**
  Connect with a 9-pin, male/ female, serial communications straight cable.
- **IS GSC-01 powered?**
  Connect to noise-free, 24[V]DC, 1.3[A] or higher power supply as labeled on the rear panel.
- **Is this baud rate and flow control set correctly in GSC-01 Configuration Program?**
  Match setting of Baud rate and flow control of PC with GSC-01.

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Chapter 3: Using GSC-01

6. Using a PC to Position Motorized Stage

This controller receives controlling commands from PC or an external control device via a RS232C to realize desired operations. This controller follows the command system from the SHOT series. Part of functions of the system has been extended. To send a controlling command to this controller from an external device, specified command codes and parameters should be followed by the terminator characters (CR + LF). This controller sends strings and the terminator characters (CR + LF) to return the execution results and requested values for a command sent from an external device. Command codes and parameters given to this controller are not case-sensitive. This controller always returns answers and results in upper-case.

The commands prepared for this controller are roughly categorized as the following two groups:

a) SHOT series compatible commands
b) SHOT series extended commands

6-1. SHOT Series Compatible Commands

The following commands for this controller are compatible with the command system of the SHOT series.

Command	Character
Return to Mechanical Origin	H :
Set Relative Move pulse count	M :
Set Absolute Move pulse count	A :
JOG command	J :
Drive command	G :
Deceleration and stop	L :
Stop	L : E
Set electronic (logical) origin	R :
Speed settings	D :
Motor Free/ Hold command	C :
Check Status1	Q :
Check Status2	! :
Check internal information Version	? : V
Check internal information Revision	? : -
I/O output	O :
I/O input	I :

Note that the parameters and returns in same commands are different from the other SHOT series controller owing to the number of axes.

6-2. SHOT Series Extended Commands

The following commands for this controller have been added to the existing SHOT series command system:

Command	Character
Offset of Origin command	S : N
JOG Speed set command	S : J
Offset of Origin Acquisition	V : N
JOG Speed Acquisition	V : J
Sensor Status Acquisition	? : L

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6-3. Details of Commands

1. SHOT Series Compatible Commands

(1) H command: Return to Mechanical Origin

・Features：

This command is used to detect the mechanical origin for a stage and set that position as the origin. The moving speed S: 500pps, F: 5000pps, R: 200mS. Running a stop command during the homing operation suspends the operation. Limit sensor's detection unplanned in the sequence during the homing operation suspends the operation.

Any commands except the stop command or checking command are not acceptable during the homing operation. Deceleration is not available if the limit sensor is activated.

For driving in the normal rotation, the limit sensors are assigned as follows.

1) LS0 CCW(+)
2) LS1 CW(−)

For driving in the reverse rotation, the limit sensors are assigned as follows.

1) LS0 CCW(−)
2) LS1 CW(+)

If motor-free, an error is generated to inhibit the homing operation.

・Command format

H：1	Detect the mechanical origin.
H：W	Detect the mechanical origin.

・Return

Normal	"OK"
Error	"NG"

(2) M command: Set number of pulses for relative travel

・Features：

The command to set the moving distance and direction of the stage. This device runs this command and then runs the driving command to drive the actual stage. The stage accelerates/decelerates as set in the speed setting command.

If this command is repeated without running the driving command, the last run this command or the 'Command to set number of pulses for absolute travel' is effective. If the return to mechanical Origin Command, JOG Command or Stop Command is run, the values set in this command are canceled. A command error is generated if a coordinate after the move exceeds the specified limit (+/- 16,777,215).

While motor-free, running this command causes a command error.

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・Command format
M:nmPx
・Parameter

n: '1' or 'W'	Name of axis to operate
m: '+' or '-'	+: Moves the axis in the positive direction, -: Moves the axis in the negative direction
x: Moving pulse	Set a number from 0-16,777,215

・Return

Normal	"OK"
Error	"NG"

Example)	M:1+P1000	Sets 1000pulse move in the positive direction.
	M:W-P5000	Sets 5000pulse move in the negative direction.

(3) A command: Set number of pulses for absolute travel

・Features:
The command to set the moving distance and direction of the stage. This device runs this command and then runs the driving command to drive the actual stage. The stage accelerates/decelerates as set in the speed setting command.
If this command is repeated without running the driving command, the last run this command or the 'Command to set number of pulses for Relative travel' is effective. If the return to mechanical Origin Command, JOG Command or Stop Command is run, the values set in this command are canceled. A command error is generated if a coordinate after the move exceeds the specified limit (+/- 16,777,215).
While motor-free, running this command causes a command error.
・Command format
A:nmPx
・Parameter

n: '1' or 'W'	Name of axis to operate
m: '+' or '-'	+: Moves the axis in the positive direction, -: Moves the axis in the negative direction
x: Moving pulse	Set a number from 0-16,777,215

・Return

Normal	"OK"
Error	"NG"

Example)	A:1+P1000	Set a move to coordinate 1000.
	A:W-P5000	Set a move to coordinate -5000.

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(4) J command: JOG Command

・Features:

Set jog operation for the stage. This device runs this command and then runs the driving command to drive the actual stage. The stage moves at a preset jog speed without acceleration/ deceleration. The jog speed is set in the 'JOG Speed Set' command. When stop this, stop by L command. (When there is not L command, move to Limit sensor and stop in Limit sensor).

Running a different moving command (M command, etc) without running the driving command cancels this command. While motor-free, running this command causes a command error.

・Command format

J:nm

・Parameter

n: '1' or 'W'		Name of axis to operate
m: '+' or '-'		+: Moves the axis in the positive direction, -: Moves the axis in the negative direction

・Return

Normal	"OK"
Error	"NG"

Example) J:1+ Set jog operation in the positive direction.

(5) G command: Driving command

・Features:

The command to perform the driving operation of the stage. The stage is driven according to the 'M command' / 'A command' and 'J command' run immediately before. On detecting a limit, the stage being driven stops immediately without acceleration/ deceleration.

Running this command without running a moving command (M command/ A command or J command) generates a command error.

While motor-free, running this command causes a command error.

・Command format

G: Drive

・Return

Normal	"OK"
error	"NG"

Example) M:1+P1000

G: Moves 1000pulse in the positive direction.

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(6) L command: Decelerate and stop

・Features:

When this command is executed, the stage decelerates and stops.

・Command format

L:1	Decelerate and stop
L:W	Decelerate and stop

・Return

Normal	"OK"
Error	"NG"

(7) L:E command: Immediate stop

・Features:

Stops the driving of the stage without deceleration.

Unlike emergency stop signal input, this command does not motor-free.

・Command format

L:E	Stops immediately

・Return

Normal	"OK"
Error	"NG"

(8) R command: Electronic (Logical) Zero set command

・Features:

Set the current coordinate to the electronic (logical) zero. After running this command, the current position is set to ZERO.

・Command format

R:1	Set the electronic (logical) origin
R:W	Set the electronic (logical) origin

・Return

Normal	"OK"
Error	"NG"

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(9) D command: Speed setting

・Features:

Sets the minimum/ maximum speeds and acceleration/ deceleration time for moving the stage. The minimum speed is the driving speed S, the speed when the stage starts. The maximum speed is the driving speed F that specifies the maximum speed of the stage. The unit of the speeds is [PPS].

Acceleration/ deceleration time specifies the acceleration time from the driving speed S to F, and the deceleration time from F to S. The unit of time is mS.

The initial values are as follows:

Minimum speed S	500[PPS]
Maximum speed F	5000[PPS]
Acceleration/ Deceleration Time	200[mS]

(* If setting Configuration Program, obey the value.)

Be sure to set the maximum speed F higher than the minimum speed S.

Set the speed in 100[PPS]. Values less than 100[PPS] are rounded down.

・Command format

D:nSspd1Fspd2Rspd3

・Parameter

n: '1' or 'W'	Name of axis to operate
spd1: Minimum Speed S	Set a number from 100-20000. [PPS]
spd2: Maximum Speed F	Set a number from 100-20000. [PPS]
spd3: Acceleration/ Deceleration time	Set a number from 0-1000. [mS]

・Return

Normal "OK"

Error "NG"

Example) D:1S500F5000R200 Set the minimum speed to 500[PPS], the maximum speed to 5000[PPS],and the acceleration/ deceleration time to 200[mS].

(10) C command: Motor Free/ Hold Command

・Features:

Deenergize (OFF)/ energize (ON) the motor.

・Command format

C:nm

・Parameter

n: '1' or 'W'	Name of axis to operate
m: '0' or '1'	0: free motor, 1: hold motor

・Return

Normal "OK"

Error "NG"

Example) C:10 Free motor

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(11) Q command: Status1

・Features:
On receipt of this command, the controller returns the coordinate and the current state.
・Command format
Q:
・Return – 1000, ACK1, ACK2, ACK3
Coordinate

ACK1:	X	Command error
	K	Command accepted normaly
ACK2:	L	LS stop
	K	Normal stop
ACK3:	B	Busy status
	R	Ready status

*) Coordinate value has a fixed length of ten digits, including symbols.
(symbols are left-aligned, coordinates value right-aligned).

(12) ! command: Status2

・Features:
On receipt of this command, the controller returns the stage operating status.
・Command format
!:

・Return	B	Busy status
	R	Ready status

(13) ? command: Internal Information

・Features:
Returns the version number of firmware in this controller.
・Command format
?:V

・Example return	V1.00	ROM Version Ver1.00

・Command format
?:-

・Example return	001	Revision number 001

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(14) O command: I/O Output

・Features:

Sets the status of the I/O interface output ports. The status of a port is set to a number from 0-15.

・Command format

O:a

・Parameter

a:0-15 refer to follows for the parameter

Output	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DO0	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DO1	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DO2	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DO3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

・Return

Normal "OK"

Error "NG"

Example)O:1 Sets the I/O interface output port DO0 to 'ON'.

(15) I command: I/O Input

・Features:

Returns the current status of the I/O input ports. The status of a port is returned in a number from 0-15.

・Command format

I:

・Return

Input	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
DI0	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON
DI1	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
DI2	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON
DI3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON

Example) I:

return:2 Only DI1 is 'ON'.

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2. SHOT Series Extended Commands

(16) S:N command: Offset of Origin Setting Command

・Features:

Sets an offset of origin. Specifying an offset with this command inserts a move by an equal distance to the offset value after the homing operation. When the offset move finishes, the position reached replaces the origin position.

The offset of origin is effective only for the homing operation in MINI system. If Center system is selected for the homing operation, the value set in this command is ignored. Turning the power off initializes the value specified in this command. The factory-set initial value is zero.

・Command format

S:Np

・Parameter

p:offset value — Set a value from 0-16,777,215.

・Return

Normal "OK"

Error "NG"

Example) S:N10000 — Sets a 10000pulse offset of origin from machine zero.

(17) S:J command: JOG Speed Set

・Features:

Sets a driving speed in [PPS] for jog operations (by the J Command, JOG switch on the front panel or jog signal in the I/O).

Turning the power off initializes the value specified in this command. The factory-set initial value is 500[PPS]. Set a speed in 100[PPS]. A value less than 100[PPS] will be rounded down.

・Command format

S:Jspd

・Parameter

spd:Jog speed — Set a number 100-20,000[PPS]

・Return

Normal "OK"

Error "NG"

Example) S:J1000 — Sets the jog speed to 1000[PPS].

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(18) V:N command: Offset of Origin Acquisition Command

・Features:
Returns an offset value from the origin position in pulses.
The number to be returned 0-16,777,215
・Command format
V:N
・Return
0-16,777,215

(19) V:J command: Jog Speed Acquisition Command

・Features:
Returns a jog speed in pps. The number to be returned is 100-20,000.
・Command format
V:J
・Return
100-20,000

(20) ?:L command: Sensor Status Acquisition Command

・Features:
Returns the status of the sensor designated with the sensor name.
・Command format
?:Lp
・Parameter
p:sensor name 0:LS0, 1:LS1, 2:I/O_JOG+ signal, 3:I/O_JOG- signal, 4:I/O emergency stop signal
・Return
0 :OFF
1 :ON

Example) ?:L0
return:1 LS0 sensor ON

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7. Using I/O Signal

GSC-01 Controller has the photo-isolated I/O interface, which cab be used to control from an external controlling device. The I/O interface of GSC-01 Controller is comprised of the following signal wires.

DI0 - 3	Input: General purpose input
DO0 - 3	Output: General purpose output
EMGSTOP	Input: Emergency Stop
JOG+	Input: Jog operation input in the positive direction
JOG-	Input: Jog operation input in the negative direction
COM+	Input common
COM-	Output common
INT+24V	Internal +24V power output
INTGND	Internal power ground

The pin assignments used for the I/O interface are as follows:

No.	Name	No.	Name
1	INT+24V	11	COM+
2	INTGND	12	COM-
3	JOG+	13	JOG-
4	EMGSTOP	14	-
5	-	15	-
6	DI0	16	DI1
7	DI2	17	DI3
8	-	18	-
9	DO0	19	DO1
10	DO2	20	DO3

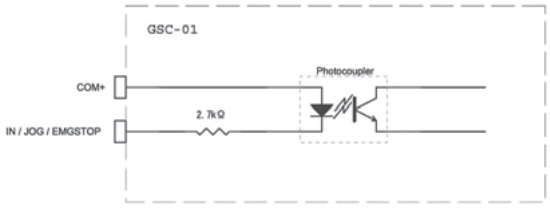

Fig. 7-1 I/O Input
(DI0-3, JOG, EMGSTOP) Circuit

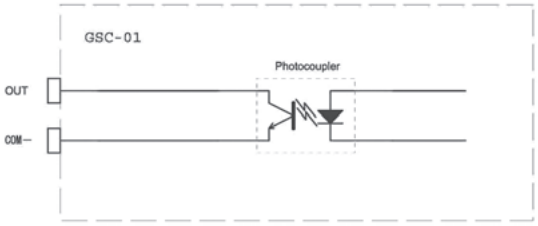

Fig. 7-2 I/O Output (DO0-3) Circuit

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I/O signal connection example

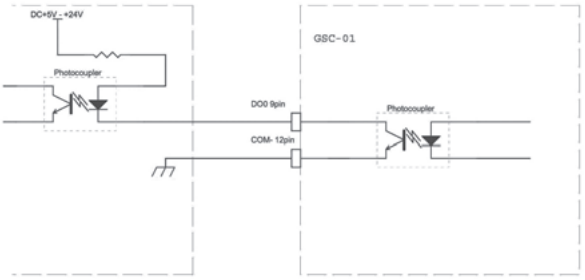

Fig.7-3 I/O OUT(DO0) connection example

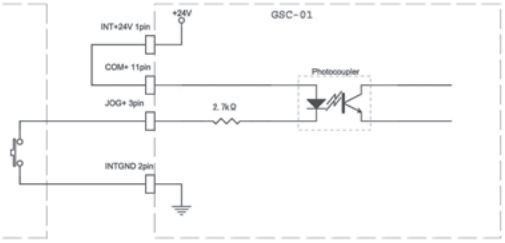

Fig.7-4 I/O IN(JOG+) Internal power supply use connection example

①DI0-3 Input, DO0-3 Output

GSC-01 Controller is equipped with 4 general purpose input/ output signals. The signals can be set or read as required by the command from host PC.

②Emergency Stop Input

The GSC-01 Controller is equipped with a photo-isolated emergency stop (EMGSTOP) input. The signal is of a B-contact type, which, if turned ON, operates the device normally while EMGSTOP the device if turned OFF. An EMGSTOP state stops the motor being driven, and disables every operation that starts the motor. To release the disabled state, reset the EMGSTOP signal to ON. **You can enable/ disable the use of the EMGSTOP signal with the jumper-pin of "JMP" of the rear panel. It is disabled in the factory settings. To enable the EMGSTOP signal, set the jumper cable for enabling EMGSTOP of rear panel GSC-01. (Open ⇒ Short)**
Deenergizing the motor in an emergency stop state can be enabled/ disabled in the Configuration Program.

⚠ Turn off a power supply in the case of the jumper setting for security.

③JOG+/ JOG- Input

The GSC-01 Controller is equipped with the JOG operating signal that allows external jog operations. Two JOG operation pins (for + and - directions) are equipped. Turning ON one of the signals performs JOG operation for that direction. JOG operation mode is not available while emergency stop.

It is produced an internal +24V power supply to I/O connector to carry out JOG operation or EMGSTOP without supplying a power supply to GSC -01 from the outside. When use I/O input with an internal power supply, connect COM- and INTGND, COM+ and INT+24V each. In addition, the inside power supply was prepared to drive a photo-coupler of GSC -01 and cannot use it for other uses.

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Chapter 4: Specification

8. Specification

(1) General specification

Power source	DC+24V
Rating current	1.3A
Operating temperature	5 to 40 ℃
Storage temperature	-20 to 60 ℃
Altitude	up to 2000m
Indoor use only	
Installation category	Ⅱ
Pollution degree	2
Ambient humidity	20 to 80%RH (no condensation)
External dimensions	47W×125D×90H (excluding projections) mm
Weight	0.4kg

(2) Performance

Controlling axis	1 axis
Maximum driving speed (F)	100 to 20kPPS (※ Programmable in 100PPS)
Minimum driving speed (S)	100 to 20kPPS (※ Programmable in 100PPS)
Acceleration/ deceleration time (R)	0 to 1000mS
Sensor input	CW (-) limit/ CCW (+) limit (Limit sensor logic can be changed with the settings of Configuration Program)
Method of return origin	MINI system/ CENTER system (Method of return origin can be changed with the settings of Configuration Program)
Interface	RS232C interface Communication parameters ・Baud rate 4800/9600/19200/38400bps (Baud rate can be changed with the setting of Configuration Program) ・Data bits 8bits ・Parity None ・Stop bit 1bit ・Flow control Hardware (RTS/CTS) / None (Flow control can be changed with the setting of Configuration Program) ・Delimiters CR+LF
I/O	4 input points (photo-coupler input) 4 output points (open-collector output)
Control signals	Emergency stop 1point (photo-coupler input) JOG input 2points (photo-coupler input)

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(3) Driver Specifications

Driver Mode	Half step/ Full step driving (Driver Mode can be changed with the setting of Configuration Program)
Driving (RUN) current	0.3A/phase to 0.8A/phase
Current down function	Automatic current down

(4) Electrical fast transmit/ burst immunity EN61000-4-4 (2012) Level2

(5) Electrostatic discharge EN61000-4-2 (2009) Level2

9. Connector pin assignment

9-1. STAGE Connector

No.	Name	No.	Name
1	Blue: motor wiring	9	Reserved
2	Red: motor wiring	10	–
3	Orange: motor wiring	11	LS(+) : + limit sensor
4	Green: motor wiring	12	LS(–) : – limit sensor
5	Black: motor wiring	13	GND
6	GND	14	–
7	–	15	Sensor power (+24V)
8	Sensor power (+24V)		

Connector D-Sub15-pin female-connector Millimeters screw

9-2. RS232C Connector

No.	Name	No.	Name
1	–	6	–
2	TxD	7	CTS
3	RxD	8	RTS
4	–	9	–
5	SG		

Connector D-Sub9-pin female-connector Inch screw

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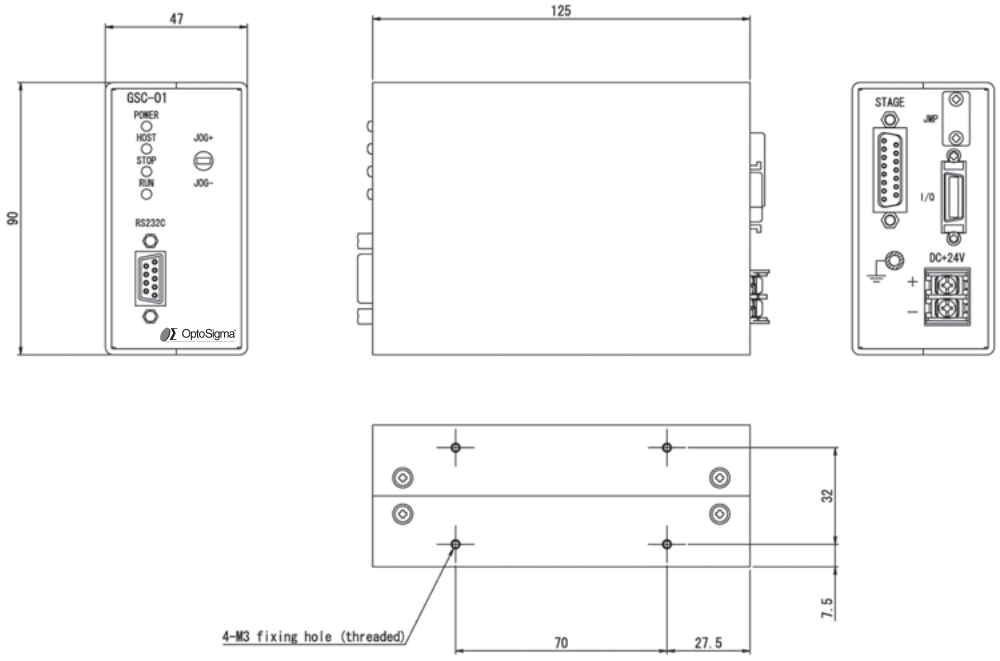
9-3. I/O Connector

No.	Name	No.	Name
1	INT+24V	11	COM+
2	INTGND	12	COM-
3	JOG+	13	JOG-
4	EMGSTOP	14	-
5	-	15	-
6	DI0	16	DI1
7	DI2	17	DI3
8	-	18	-
9	DO0	19	DO1
10	DO2	20	DO3

Connector 10220-52A2PE (SUMITOMO 3M)

10. Exterior Dimensions



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A. Appendix List of Configurations for Applicable Automatic Stages and Factory settings

A-1. List of Configurations for Applicable Automatic Stages

Model No.	Drive current	Origin	Rotation	LS Polarity
SGSP15 series	0.6	MINI	Normal	Normal close
SGSP20 series	0.66	MINI	Normal	Normal close
SGSP26 series	0.75	MINI	Normal	Normal close
TSDM series	0.35	MINI	Normal	Normal close
SGSP/OSMS40-ZF series	0.35	MINI	Normal	Normal close
SGSP/OSMS60/80-ZF series	0.75	MINI	Normal	Normal close
SGSP-40/60YAW HDS-60YAW series	0.66	MINI	Normal	Normal close
SGSP-60A/60B series	0.75	MINI	Normal	Normal close
SGSP-ACT series	0.35	MINI	Normal	Normal close
HPS series	0.75	MINI	Normal	Normal close
HDS-80/120YAW series	0.75	MINI	Normal	Normal close
TAMM series	0.75	MINI	Normal	Normal close

A-2. Factory Settings

・Homing	Origin Mode	MINI System
	Offset of Origin	0
・Current settings	Driving(RUN) Current	0.35[A]
	Stop (STOP) Current	0.175[A]
・Driving Method	Half Step Drive	
・Driving Direction	Normal Rotation	
・Limit Sensor setting	LS Polarity	Normal close
・Emergency Processing	Emergency Signal Input	Disabled
		Emergency signal setting jumper: OPEN
	Energize in emergency stop	Enable
・RS232C	Baud Rate	9600[bps]
	Flow Control	Enable
・Initial Speed	Minimum Speed(S)	500[PPS]
	Maximum Speed (F)	5000[PPS]
	Acceleration/ Deceleration time(R)	200[mS]
・Other	JOG Operation Speed	500[PPS]
	JOG Switch/ Signal	Enable
	Energize on Startup	Enable

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B. Appendix About Origin System

GSC-01 is equipped with two types of Origin systems as follows:

- MINI System
- CENTER System

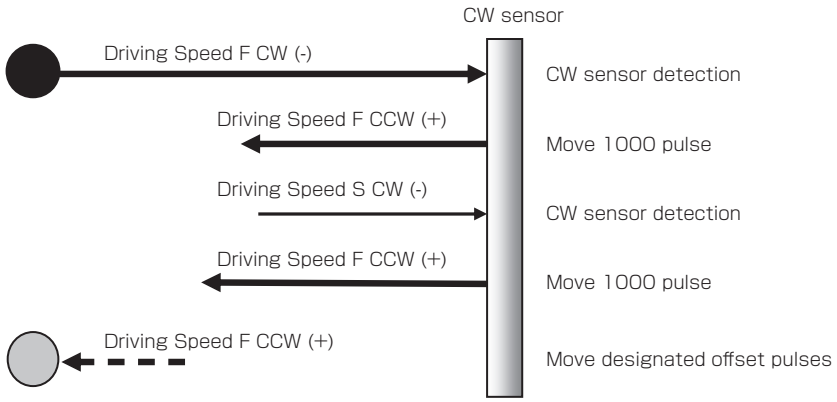
The systems are described below. Note that the chart is prepared for normal rotation. For reverse rotation, the relationship between CW and CCW is reversed.

The moving speeds and acceleration/ deceleration time in homing are as follows.

- Driving Speed S 500[PPS]
- Driving Speed F 5000[PPS]
- Acceleration/ Deceleration time R 200[mS]

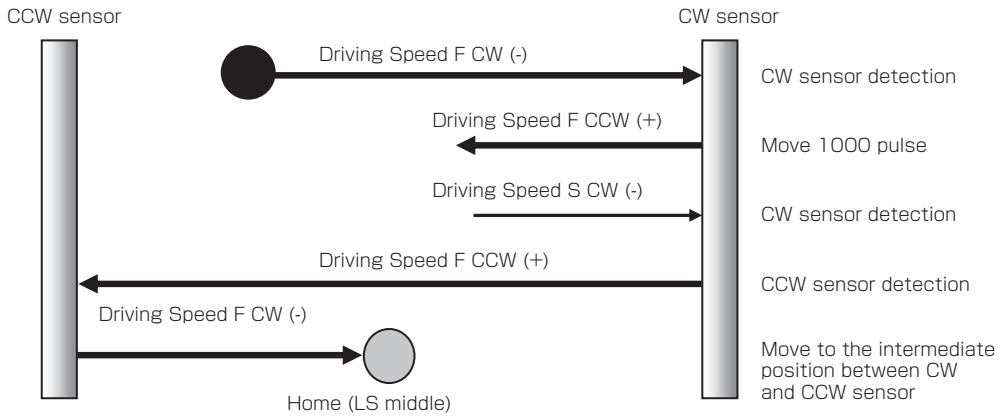
These parameters are not affected by the command to Set Speed (D command).

B-1. MINI System



If no offset is specified, sets the home position after 1000pulse movement without doing it.

B-2. CENTER System


CCW sensor
CW sensor
Driving Speed F CW (-)
CW sensor detection
Driving Speed F CCW (+)
Move 1000 pulse
Driving Speed S CW (-)
CW sensor detection
Driving Speed F CCW (+)
CCW sensor detection
Driving Speed F CW (-)
Move to the intermediate position between CW and CCW sensor
Home (LS middle)

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MEMO

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